



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/077,854	02/20/2002	Hiroyuki Hoshiya	520.41222X00	3183

20457 7590 10/08/2003

ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-9889

EXAMINER

BEACHAM, CHRISTOPHER R

ART UNIT	PAPER NUMBER
----------	--------------

2653

3

DATE MAILED: 10/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/077,854

Applicant(s)

HOSHIYA ET AL.

Examiner

Christopher R. Beacham

Art Unit

2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3,9 and 10 is/are rejected.
- 7) ☒ Claim(s) 4-8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the examiner has cited the references on form PTO-892, they have not been considered.

Claim Objections

They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-3 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Tanaka et al. (hereinafter Tanaka) (US 6,608,739 B1).

- Regarding claims 1 and 2, Tanaka discloses a magnetic head provided with a spin valve type magnetoresistive element in which a ferromagnetic layer 41, which a direction of the magnetization is substantially pinned for an external magnetic field and a soft magnetic free layer 8, the magnetization of which can be turned according to an external magnetic field are laminated via a non-magnetic intermediate layer 5 and characterized in that the magnetization of the soft magnetic free layer 8 is rotated according to the external magnetic field when induced, a relative angle between a direction of the magnetization of the soft magnetic free layer 8 and a direction of the magnetization of the ferromagnetic layer 41 varies and magnetoresistance is produced (Fig. 10), wherein:

a single magnetic domain turning ferromagnetic layer ^{(col} 10 is formed on the soft magnetic free layer 8 via a non-magnetic separating layer 9. (Fig. 10); and

the single magnetic domain turning ferromagnetic layer 10 turns the soft magnetic free layer 8 a single magnetic domain so that soft magnetic free layer 8 has magnetization substantially induced in direction substantially perpendicular to an external magnetic field (Fig. 10).

the soft magnetic free layer 8 and the single magnetic domain turning ferromagnetic layer 10 are magnetostatically coupled via the non-magnetic separating layer 9 at the end of the track width and a closed magnetic circuit is formed, where no ferromagnetic or antiferromagnetic coupling is produced.

- Regarding claim 3, Tanaka discloses a bias magnetic field being applied to the ferromagnetic pinned layer 41 by laminating the ferromagnetic pinned layer 41 and an antiferromagnetic film 13 or a hard magnetic film (not shown) and producing exchange coupling and the ferromagnetic pinned layer 41 is polarized in direction substantially perpendicular to an external magnetic field (col. 17, lines 39-44).

- Regarding claim 10, Tanaka teaches that the non-magnetic layer 9 being formed by a deposition of a layer including at least one of Cu, Au, Ag, Pt, Re, Ru, Ir, Os, Ta, Hf, Nb, Ti and W or a layer including these and a layer made of oxide or a mixture of least one of Cu, Au, Ag, Pt, Re, Ru, Ir, Os, Ta, Hf, Nb, Ti and W and oxide (col. 11, lines 49-53).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (hereinafter Tanaka) (US 6,608,739 B1), as applied to claim 1 above, and further in view of Hayashi (US 6,456,468 B1).

- Regarding claim 9, Tanaka teaches all the features except the non-magnetic separating layer 9 being made of Ta, Hf, Nb, Ti or W or the oxide of any of these.

Hayashi discloses a non-magnetic layer 105 being made from Ta, Hf, Zr, W or the like (col. 6, lines 43-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the non-magnetic separating layer of Tanaka with Ta, Hf, Zr, W or the like as taught by Hayashi.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to make the non-magnetic separating layer of Tanaka with Ta, Hf, Zr, W or the like as taught by Hayashi so that the MR ratio can be increased (Hayashi; col. 6, lines 43-46).

Allowable Subject Matter

3. Claims 4-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- a. Gurney et al. (US 5,408,377) is cited to show a magnetoresistive sensor with improved ferromagnetic sensing layer and a magnetic recording system using the sensor.
- b. Fontana, Jr. et al. (US 5,701,223) is cited to show a spin valve magnetoresistive sensor with antiparallel-pinned layer and improved exchange bias layer and a magnetic recording system using the sensor.
- c. Gill (US 5,751,521) is cited to show a differential spin valve sensor structure.
- d. Fukuzawa et al. (US 6,118,624) is cited to show a magneto-resistance effect element having a magnetic biasing.
- e. Lin et al. (US 6,175,475) is cited to show a fully pinned, flux closed spin valve.
- f. Hasegawa et al. (US Patent Application Pub US 2001/0012188) is cited to show a spin valve thin film magnetic element and method for making the same.

- g. Tong et al. (US 6,317,297 B1) is cited to show a current pinned dual spin valve with synthetic pinned layers.
- h. Huai et al. (US 6,381,105 B1) is cited to show a hybrid dual spin valve sensor and method for making the same.
- i. Sakakima et al. (US 6,608,738 B1) is cited to show a magnetoresistance effect device utilizing an oxide film to produce antiferromagnetic exchange coupling between first and second magnetic films in either the pinned layer or the free layer of the device.
- j. Yang et al. ("Magnetostatic Coupling in Patterned Spin Valves". *IEEE Transactions on Magnetics*, Vol. 34, No. 5. September 1998, pages 2469-2472) is cited to show magnetostatic coupling within spin valves by altering the geometry of the patterned structures.
- k. Cross et al. ("Magnetostatic Effects in Giant Magnetoresistive Spin Valve Devices". *Applied Physics, Letter* 69, 16 December 1996, pages 3935-3937) is cited to show both internal demagnetizing fields and interlayer actions between the magnetic layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher R. Beacham whose telephone number is (703) 605-4256. The examiner can normally be reached on M-F, 8: 00 am-5: 30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone

Art Unit: 2653

number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.



Christopher R. Beacham
Patent Examiner
Art Unit 2653
October 3, 2003



WILLIAM KORZUCH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600